

hw2

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This function print out varieties of centralities

```
library(igraph)

##
## Attaching package: 'igraph'
##
## The following objects are masked from 'package:stats':
##
##     decompose, spectrum
##
## The following object is masked from 'package:base':
##
##     union

question=function(a){
  g=read_graph(a, format ="graphml" )
  print ("Degree centrality is =====>")
  print(degree(g))
  print ("Closeness centrality is =====>")
  print (closeness(g))
  print ("Betweenness centrality is =====>")
  print (betweenness(g))
  print ("PageRank centrality is =====>")
  print (page_rank(g,damping=0.9)$vector)
  print ("Assortativity centrality is =====>")
  print (assortativity_degree(g))
  print ("local clustering coef is =====>")
  print (transitivity(g,type = 'local'))
  print ("global clustering coef is =====>")
  print (transitivity(g,type = 'global'))

  ws=c()
  for(i in transitivity(g,type = 'local')){
    if (is.nan(i)){
      ws=c(ws,0)
    }
    else{
      ws=c(ws,i)
    }
  }
}
```

```

print ("Watts-Strogatz global clustering coef is =====>")
print (mean(ws)/length(ws))
}

```

question 6

```
question("/Users/Pagliacci/Desktop/PHY 525/hw2/initial_network.graphml")
```

```

## [1] "Degree centrality is =====>"
##      Kristen Bush      Colin Fallon      Linxiao Bai
##      2                9                2
##      Gul Seda Unal    Ulrik Soderstrom    Surendra Hazarie
##      6                8                7
##      Md Kamrul Hasan    Alec Kirkley      Rhys Taus
##      1                6                8
## Christina Loniewski    Solomon Abiola    Raiyan Abdul Baten
##      9                2                2
##      Nilesh Patil      Jiang Shang      Yuanzhen Du
##      7                9                2
##      Jack Teitel      Solomon Gaim    Joseph Dulemba
##      3                7                7
##      Thomas Varner    Rasoul Shafipour    Yuchen Zheng
##      10               0                1
##      Matthew Yetto    Unni Kurumbail    Keting Lyu
##      4                0                3
##      Natalia Galant    Miktat Koyuncu    Siyu Nan
##      3                5                5
## [1] "Closeness centrality is =====>"
##      Kristen Bush      Colin Fallon      Linxiao Bai
##      0.001479290      0.001748252      0.001479290
##      Gul Seda Unal    Ulrik Soderstrom    Surendra Hazarie
##      0.003703704      0.003816794      0.001745201
##      Md Kamrul Hasan    Alec Kirkley      Rhys Taus
##      0.001424501      0.003875969      0.001745201
## Christina Loniewski    Solomon Abiola    Raiyan Abdul Baten
##      0.001748252      0.001479290      0.004273504
##      Nilesh Patil      Jiang Shang      Yuanzhen Du
##      0.003831418      0.003731343      0.001479290
##      Jack Teitel      Solomon Gaim    Joseph Dulemba
##      0.003597122      0.003690037      0.001745201
##      Thomas Varner    Rasoul Shafipour    Yuchen Zheng
##      0.003816794      0.001424501      0.001424501
##      Matthew Yetto    Unni Kurumbail    Keting Lyu
##      0.001424501      0.001424501      0.003344482
##      Natalia Galant    Miktat Koyuncu    Siyu Nan
##      0.001424501      0.001424501      0.003546099
## [1] "Betweenness centrality is =====>"
##      Kristen Bush      Colin Fallon      Linxiao Bai
##      0.000000          5.000000          0.000000

```

```

##      Gul Seda Unal      Ulrik Soderstrom      Surendra Hazarie
##      5.333333      27.833333      55.000000
##      Md Kamrul Hasan      Alec Kirkley      Rhys Taus
##      0.000000      64.000000      4.000000
## Christina Loniewski      Solomon Abiola      Raiyan Abdul Baten
##      5.000000      0.000000      0.000000
##      Nilesh Patil      Jiang Shang      Yuanzhen Du
##      76.333333      69.333333      0.000000
##      Jack Teitel      Solomon Gaim      Joseph Dulemba
##      3.666667      26.500000      0.000000
##      Thomas Varner      Rasoul Shafipour      Yuchen Zheng
##      58.000000      0.000000      0.000000
##      Matthew Yetto      Unni Kurumbail      Keting Lyu
##      0.000000      0.000000      0.000000
##      Natalia Galant      Miktat Koyuncu      Siyu Nan
##      0.000000      0.000000      26.000000
## [1] "PageRank centrality is =====>"
##      Kristen Bush      Colin Fallon      Linxiao Bai
##      0.090478829      0.037041606      0.090478829
##      Gul Seda Unal      Ulrik Soderstrom      Surendra Hazarie
##      0.020692474      0.024347951      0.028691306
##      Md Kamrul Hasan      Alec Kirkley      Rhys Taus
##      0.013119430      0.028037534      0.035680894
## Christina Loniewski      Solomon Abiola      Raiyan Abdul Baten
##      0.037041606      0.090478829      0.009047883
##      Nilesh Patil      Jiang Shang      Yuanzhen Du
##      0.023673855      0.035099852      0.090478829
##      Jack Teitel      Solomon Gaim      Joseph Dulemba
##      0.017355882      0.033326761      0.030411062
##      Thomas Varner      Rasoul Shafipour      Yuchen Zheng
##      0.049953461      0.009047883      0.021045880
##      Matthew Yetto      Unni Kurumbail      Keting Lyu
##      0.032665478      0.009047883      0.027363854
##      Natalia Galant      Miktat Koyuncu      Siyu Nan
##      0.031689727      0.043709095      0.039993324
## [1] "Assortativity centrality is =====>"
## [1] 0.3395044
## [1] "local clustering coef is =====>"
## [1] 0.00000000 0.25000000 0.00000000 0.13333333 0.32142857 0.28571429
## [7]      NaN 0.20000000 0.32142857 0.25000000 0.00000000 0.00000000
## [13] 0.19047619 0.08333333 0.00000000 0.33333333 0.33333333 0.28571429
## [19] 0.20000000      NaN      NaN 0.33333333      NaN 0.33333333
## [25] 1.00000000 0.90000000 0.10000000
## [1] "global clustering coef is =====>"
## [1] 0.5740741
## [1] "Watts-Strogatz global clustering coef is =====>"
## [1] 0.008031223

```

question 7

```
question("/Users/Pagliacci/Downloads/final_network.graphml")
```

```
## [1] "Degree centrality is =====>"
##      Kristen Bush      Colin Fallon      Linxiao Bai
##           2           9           4
##      Gul Seda Unal      Ulrik Soderstrom      Surendra Hazarie
##          19          11          13
##      Md Kamrul Hasan      Alec Kirkley      Rhys Taus
##           3           7           9
## Christina Loniewski      Solomon Abiola      Raiyan Abdul Baten
##           9           2           5
##      Nilesh Patil      Jiang Shang      Yuanzhen Du
##          10          10           4
##      Jack Teitel      Solomon Gaim      Joseph Dulemba
##           5           8           8
##      Thomas Varner      Rasoul Shafipour      Yuchen Zheng
##          12           5           8
##      Matthew Yetto      Unni Kurumbail      Keting Lyu
##           6           1           5
##      Natalia Galant      Miktat Koyuncu      Siyu Nan
##           5           6           8

## [1] "Closeness centrality is =====>"
##      Kristen Bush      Colin Fallon      Linxiao Bai
##      0.001479290      0.006711409      0.006250000
##      Gul Seda Unal      Ulrik Soderstrom      Surendra Hazarie
##      0.008264463      0.007092199      0.007575758
##      Md Kamrul Hasan      Alec Kirkley      Rhys Taus
##      0.006493506      0.007299270      0.006711409
## Christina Loniewski      Solomon Abiola      Raiyan Abdul Baten
##      0.006711409      0.001479290      0.006849315
##      Nilesh Patil      Jiang Shang      Yuanzhen Du
##      0.007518797      0.007575758      0.006849315
##      Jack Teitel      Solomon Gaim      Joseph Dulemba
##      0.007194245      0.006666667      0.006711409
##      Thomas Varner      Rasoul Shafipour      Yuchen Zheng
##      0.007352941      0.007194245      0.007352941
##      Matthew Yetto      Unni Kurumbail      Keting Lyu
##      0.001424501      0.007462687      0.006666667
##      Natalia Galant      Miktat Koyuncu      Siyu Nan
##      0.001424501      0.001424501      0.007518797

## [1] "Betweenness centrality is =====>"
##      Kristen Bush      Colin Fallon      Linxiao Bai
##      0.00000      6.00000      4.00000
##      Gul Seda Unal      Ulrik Soderstrom      Surendra Hazarie
##      232.50000      30.16667      161.00000
##      Md Kamrul Hasan      Alec Kirkley      Rhys Taus
##      0.00000      36.66667      6.00000
## Christina Loniewski      Solomon Abiola      Raiyan Abdul Baten
```

```

##          6.00000          0.00000          28.83333
##      Nilesh Patil      Jiang Shang      Yuanzhen Du
##      14.91667          58.25000          35.75000
##      Jack Teitel      Solomon Gaim      Joseph Dulemba
##      1.75000          10.16667          0.00000
##      Thomas Varner      Rasoul Shafipour      Yuchen Zheng
##      30.75000          58.25000          43.50000
##      Matthew Yetto      Unni Kurumbail      Keting Lyu
##      0.00000          0.00000          46.66667
##      Natalia Galant      Miktat Koyuncu      Siyu Nan
##      0.00000          0.00000          41.83333
## [1] "PageRank centrality is =====>"
##      Kristen Bush      Colin Fallon      Linxiao Bai
##      0.079337291      0.032950291      0.018800112
##      Gul Seda Unal      Ulrik Soderstrom      Surendra Hazarie
##      0.070926740      0.033975858      0.056824117
##      Md Kamrul Hasan      Alec Kirkley      Rhys Taus
##      0.016581645      0.033779053      0.032950291
## Christina Loniewski      Solomon Abiola      Raiyan Abdul Baten
##      0.032950291      0.079337291      0.028826386
##      Nilesh Patil      Jiang Shang      Yuanzhen Du
##      0.036088349      0.032801274      0.024147518
##      Jack Teitel      Solomon Gaim      Joseph Dulemba
##      0.018105151      0.038325890      0.025726886
##      Thomas Varner      Rasoul Shafipour      Yuchen Zheng
##      0.048048002      0.029846482      0.043543359
##      Matthew Yetto      Unni Kurumbail      Keting Lyu
##      0.040649075      0.007933729      0.023497234
##      Natalia Galant      Miktat Koyuncu      Siyu Nan
##      0.041730309      0.044521377      0.027796000
## [1] "Assortativity centrality is =====>"
## [1] 0.169428
## [1] "local clustering coef is =====>"
## [1] 0.0000000 0.2777778 0.1666667 0.1345029 0.3272727 0.1410256 0.3333333
## [8] 0.1428571 0.2777778 0.2777778 0.0000000 0.1000000 0.2666667 0.1555556
## [15] 0.1666667 0.3000000 0.3928571 0.3571429 0.2424242 0.1000000 0.1071429
## [22] 0.7333333      NaN 0.2000000 0.7000000 0.6666667 0.2500000
## [1] "global clustering coef is =====>"
## [1] 0.5369318
## [1] "Watts-Strogatz global clustering coef is =====>"
## [1] 0.00935178

```